

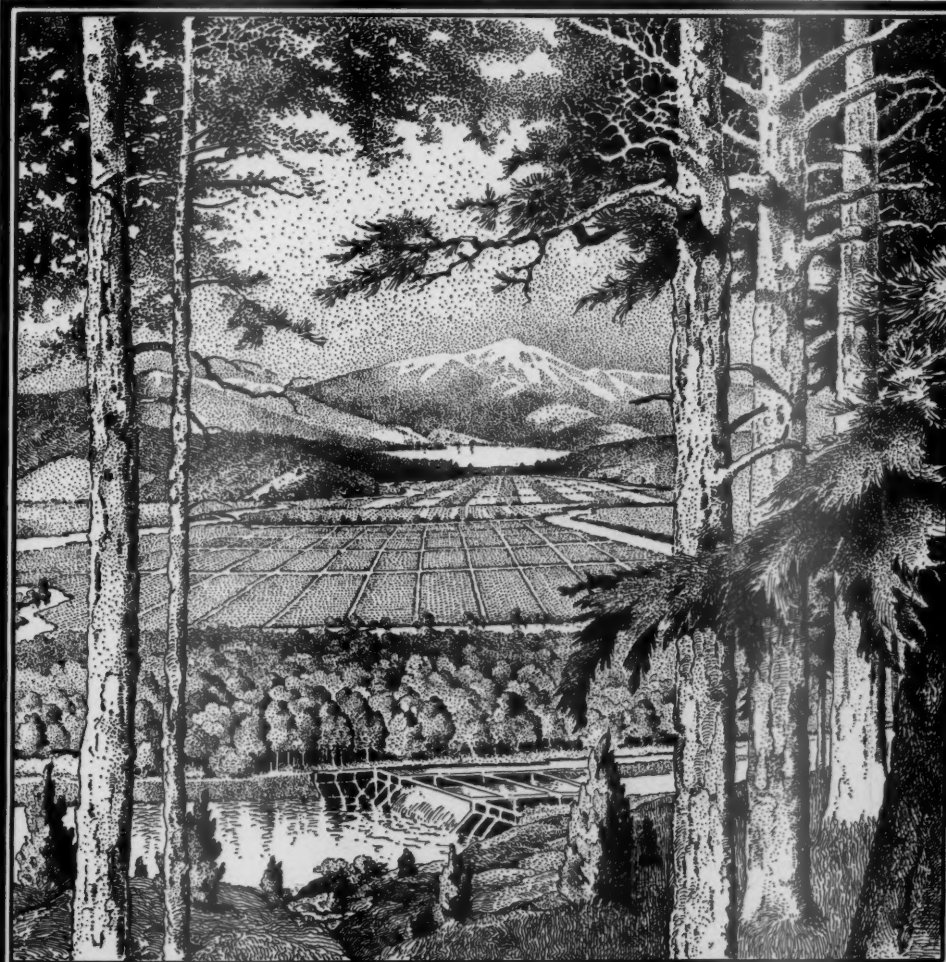
THE TENTH NATIONAL IRRIGATION CONGRESS

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SEPTEMBER, 1902

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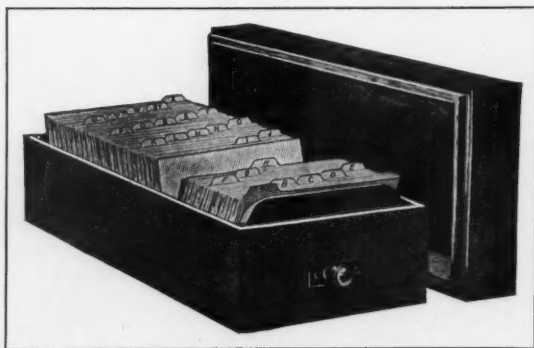
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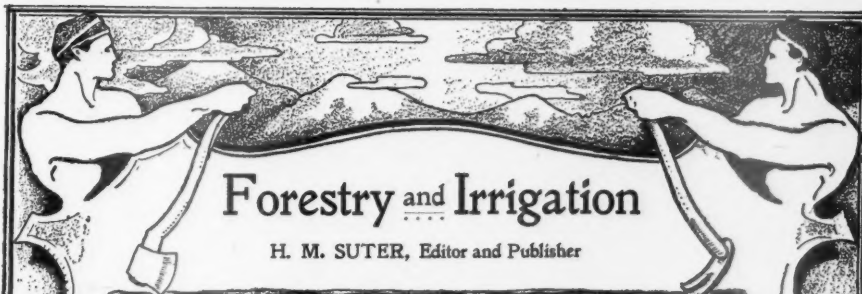
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1. The adoption by the Federal Government of a permanent policy for the reclamation and settlement of the public domain, under which all the remaining public lands shall be held and administered as a trust for the benefit of the whole people of the United States, and no grants of the title to any of the public lands shall ever hereafter be made to any but actual settlers and homebuilders on the land.
2. The preservation and development of our national resources by the construction of storage reservoirs by the Federal Government for flood protection, and to save for use in aid of navigation and irrigation the flood waters which now run to waste and cause overflow and destruction.
3. The construction by the Federal Government of storage reservoirs and irrigation works wherever necessary to furnish water for the reclamation and settlement of the arid public lands.
4. The preservation of the forests and reforestation of denuded forest areas as sources of water supply, the conservation of existing supplies by approved methods of irrigation and distribution, and the increase of the water resources of the arid region by the investigation and development of underground supplies.
5. The adoption of a harmonious system of irrigation laws in all the arid and semi-arid states and territories under which the right to the use of water for irrigation shall vest in the user and become appurtenant to the land irrigated, and beneficial use be the basis and the measure and limit of the right.
6. The holding of an annual Irrigation Congress, and the dissemination by public meetings and through the press of information regarding irrigation, and the reclamation and settlement of the arid public domain, and the possibilities of better agriculture through irrigation and intensive farming, and the need for agricultural education and training, and the creation of rural homes as national safeguards, and the encouragement of rural settlement as a remedy for the social and political evils threatened by the congestion of population in large cities.



Forestry and Irrigation

H. M. SUTER, Editor and Publisher

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FOREST OF NOBLE FIR, HEMLOCK, AND RED FIR IN OREGON (SEE PAGE 362).

Forestry and Irrigation.

VOL. VIII.

SEPTEMBER, 1902.

No. 9.

NEWS AND NOTES.

New Forest Reserves.

Seven new forest reserves have been established recently by presidential proclamation. These include three new reserves in Arizona: The Mount Graham Forest Reserve, 118,600 acres in extent, located in Graham county; the Santa Catalina Forest Reserve of 155,520 acres, in Pima county, and the Chiricahua Forest Reserve, in Cochise county, of 169,600 acres in extent. In Montana two new reserves, the Madison Forest Reserve of 736,000 acres and the Little Belt Mountains Forest Reserve of 501,000 acres, have been established. The first-named reserve is in Madison and Gallatin counties, bordering on the western side of the Yellowstone National Park. The Little Belt Reserve is located in Meagher and Fergus counties.

A large new reserve has also been set apart in New Mexico, to be known as the Lincoln Forest Reserve. It is 500,000 acres in extent and is located in Lincoln county. An unusually large reserve has just been set aside in Alaska, to be known as the Alexandria Archipelago Forest Reserve, and contains 4,506,240 acres.

In addition to the foregoing new reserves, a number of changes have been made in the reserves already established. Lands have been added on the eastern side of the Yellowstone Forest Reserve, increasing its area by 24,960 acres. The Medicine Bow Forest Reserve, in Wyoming, has had recent additions made to the amount of 20,533 acres. The White River Reserve, in Colorado, has been decreased in area by 68,160 acres along the headwaters of the White and Yampa Rivers. The Crater Lake National Park of 164,560 acres, which was established by Congress at its last

session, reduces the size of the Cascade Forest Reserve, in Oregon, by 152,680 acres.

The total area of all the forest reserves is now 58,850,925 acres. It is interesting to note that the total area of the United States, exclusive of island possessions, is 2,362,960,000 acres. Thus it will be seen that the forest reserves now amount to about one-fortieth, or about $2\frac{1}{2}$ per cent, of the entire area of the United States. In square miles the area of the reserves is 91,954, or almost twice the size of Pennsylvania.

Mr. Walcott's Trip.

Hon. Charles D. Walcott, Director of the U.S. Geological Survey, in whose charge has been placed the examinations of forest reserves and the work of reclamation of arid lands, is making an extended trip of inspection through the West. At Helena, Mont., he met Mr. F. H. Newell, the Chief Engineer of the Reclamation Survey, and, together with Mr. Arthur P. Davis and other engineers, he made an examination of some of the reclamation projects of Montana, Wyoming, and other states.

In Wyoming particular attention was given to the proposed system of reservoirs in the Big Horn Mountains and to the possible storage and diversion of the Shoshone River. Proceeding eastward, the party was joined by Hon. Frank W. Mondell, Member of Congress for Wyoming, and later by Senator Francis E. Warren. The trip was made up Sweetwater River to what is known as "Devil's Gate" Reservoir, on the Tom Sun Ranch. Later Mr. Walcott continued his trip to visit reclamation projects in Nevada.

Forest Tree Nurseries in New York.

The New York Forest, Fish, and Game Commission has decided to establish state nurseries for the propagation of seedling trees which are to be used in reforesting denuded lands in the state forest preserve, and for free distribution throughout the state.

The commission has already established a forest tree nursery in the Catskill region at a place near Brown Station, on the Ulster and Delaware Railroad. This nursery, which is favorably located as regards slope, exposure, and climatic conditions, is planned for the raising of two million seedlings, the beds and rows being laid out accordingly. A large number of different species are planted there, and this nursery will be used to meet the demands for free distribution.

Work on a much larger nursery will be commenced this fall on lands selected for the purpose at Saranac Inn Station, on the Adirondack Division of the New York Central Railroad. At this point there is a clearing of about six acres on which farming operations have been carried on for several years, leaving the soil in good condition for nursery purposes. This clearing is closely surrounded on all sides by a tall forest, which will afford protection and shelter from unfavorable weather conditions.

The soil will be carefully prepared this fall and made into beds of suitable size. The commission expects to carry about three million seedlings in this nursery at all times, and, in addition, to set out enough transplants for their work in reforestation. In case a larger number is required for this work the area of the nursery can be easily enlarged.

While the product of the Catskill nursery will be mainly used for free distribution, the Adirondack nursery will be devoted almost entirely to the propagation of seedlings to be used in the silvicultural work planned by the commission. The intention at present is to raise only White Pine and Red Spruce in the Saranac nursery, as it seems advisable to first give the native species a fair trial.

Two parties, each in charge of a professional forester in the employ of the commission, are now traversing the

woods in search of seed cones, which must be gathered in the autumn or early fall before the scales open. The foresters were instructed to secure several hundred bushels of cones, if possible, but, as this is not a seed year for White Pine or Red Spruce, it is doubtful if they will be able to secure much seed this fall.

A neat and attractive building will be erected, in which the forester in charge will reside permanently. It will contain a loft for the preparation, care, and storage of seeds, while part of the ground floor will be utilized as a tool-house and for storage purposes.

Commencing three years ago, the commission began tree planting, and has continued the work each successive season. Last spring over half a million seedlings were set out on the denuded and burned lands near Lake Clear Junction, Franklin county. This work was done under the personal direction of Foresters Knechtel and Pettis, who employed sixty-three men for more than a month. At this date very few of the young trees set out last spring have died, the loss being less than one per cent. The plantation was visited recently by the Ways and Means Committee of the Legislature, who expressed themselves as well pleased with the work.

Examination of Engineers.

An examination of civil and hydraulic engineers will be held at an early date to secure additional men for the service of the U. S. Geological Survey. The men selected will be used as assistant engineers and hydrographers in connection with the survey of the water resources of the country, and also in the reclamation work in the West. Persons desiring particulars concerning the coming examination can secure the same by addressing the Civil Service Commission, Washington, D. C.

News from the Forest Reserves.

Mr. A. A. Anderson, Superintendent of the Teton and Yellowstone Forest Reserves, has just completed a tour of these extensive

reserves, selecting and appointing men, organizing an efficient patrol service, and examining the new boundaries of these reserves, with a view of making such corrections as may be necessary. Mr. Anderson reports that an unusually large amount of outside live stock, especially sheep, has been driven into the new additions to these reserves, causing much damage to the range.

Major F. A. Fenn, Superintendent of the Forest Reserves of Idaho and Montana, has just finished an extensive tour of the Lewis and Clarke and the Flat-head Reserves, in Montana.

There is great rejoicing among the forest officers of the Sierra and Stanislaus Reserves of California over the attitude of the courts toward sheep trespass. The late decisions practically refute those of Judge Wellborn, and grant a temporary injunction to restrain sheepmen in their efforts to graze sheep in the reserves in violation of the rules and regulations, and practically in defiance of the orders of the Department of the Interior.

Mr. E. T. Allen, Inspector of Forest Reserves, has spent nearly all of the summer in the reserves about Pikes Peak and the Battlement Mesa, Colorado. He reports a wretched condition of affairs. Serious maladministration has led to extensive timber trespass, much of which, it is believed, has been hidden by intentional setting of forest fires.

Inspector H. D. Langille has completed his work in the Uintah Forest Reserve, in Utah, and is now working in the White River Reserve, in Colorado. He reports serious overgrazing of the Uintah Reserve. Much of Mr. Langille's time has been taken up by cases of timber trespass. The whole matter of timber cutting, both from sales and free use, has been seriously mismanaged for some time, which has caused the settlers and miners in and about the reserve much inconvenience.

A peculiarly unsatisfactory condition exists at present in the Uintah Forest Reserve on account of the lack of demarcation of its southern boundary line, this being the boundary line between the Uintah Forest Reserve and the Uintah Indian Reservation. A number

of sheepmen who have leased Indian lands are having other sheepmen, presumably grazing under permit in the forest reserves, arrested for trespass on their leased grounds. In turn, Supervisor Marshall is trying to prevent outside sheepmen from grazing on what he believes to be lands within the forest reserve.

Seth Bullock, the Supervisor of the Black Hills Forest Reserve, has been authorized to employ extra assistance, in view of the great danger from fire in the extensive sections of beetle-killed timber.

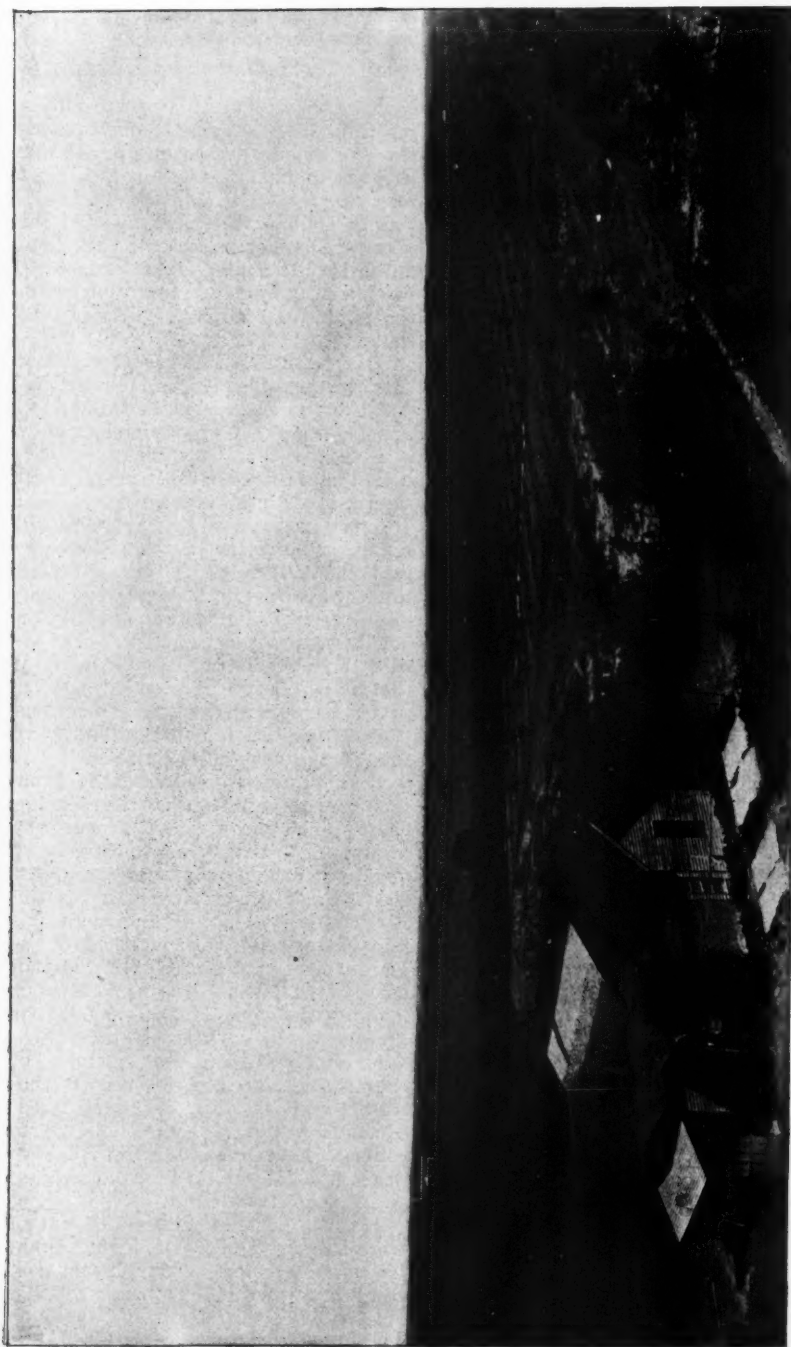
Supervisor Moser, of the Lewis and Clarke Forest Reserve, in Montana, reports an unusually successful season. Among other things accomplished by this officer is the first successful prosecution of a timber trespasser on forest reserve lands in Montana.

A regular "gun permit" is now issued by the supervisors of the reserves in northern California. No one is allowed to carry firearms in these reserves without a permit. The permit is issued on condition that the bearer will obey all rules and regulations, and especially that he will carry the permit whenever in the reserve with arms; submit cheerfully to inspection of permit and gun; that he will not mutilate live timber or any other property; observe the game laws, and extinguish fires before leaving camp. This step has become necessary on account of the many fires started every year by gun-carrying parties of tourists.

Mr. Fred. Breen, Supervisor of the Black Mesa and San Francisco Mountains Reserves, in Arizona, reports numerous fires in these reserves. On account of the unusual drouth and summer logging the work of the rangers has been very arduous this season.

Mr. R. C. McClure, the Supervisor of the Gila Forest Reserve, reports that the reserve is decidedly overgrazed. He adds, however, that it is difficult to estimate how much stock would have perished had it not been for the recourse to reserve pastures.

Mr. W. T. May, Superintendent of Forest Reserves of Colorado and Utah, has left the service. Armor Thompson, Supervisor of the Teton Forest Re-



IRRIGATION IN THE CIMARRON VALLEY, SOUTHWESTERN KANSAS.

serve, in Wyoming, has also left the service, and has been succeeded by Mr. Robt. Miller, of Jackson, Wyoming. Mr. Archie P. Craig, of Mesa, Colorado, has been appointed Supervisor of the Black Mesa Forest Reserve.

Meeting of the Utah Irrigation Association.

An important meeting of the Utah Irrigation Association will be held at Salt Lake City on October 2 and 3. A number of important matters will come up for consideration, among them the proposed reclamation works in the state, a discussion of forest problems, and the grazing question.

Progress of Reclamation Work.

The reclamation work by the federal government, through the U. S. Geological Survey, is being carried forward rapidly.

During the month of August, in Arizona, work has been continued in obtaining information concerning irrigable lands, and data was secured for a cadastral map. In California, low-water measurements have been going on, and especial attention given to the rate of flow of water beneath the surface. The surveys in the Gunnison Canyon, Colorado, have been continued for the purpose of preparing detailed plans for taking water out in the vicinity of Montrose. In the northeastern part of the state, along the South Platte River, surveys have been begun for the reclamation project in the vicinity of Sterling.

The measurement of the headwaters of Snake River has been continued in Idaho, and also preliminary surveys of several possible reservoir sites. In Kansas the best locality for deep wells has been under consideration.

There are a number of field parties in Montana engaged in the Milk River survey, ascertaining the best location for diversion canals and the possibility of irrigable lands. A boring party has also begun exploration with the diamond drill to find the depth of bed rock at the outlet of Saint Mary's Lake. The preliminary reconnaissance has been begun

to ascertain the possibility of diverting water from Yellowstone River upon the lands north of it.

In Nebraska the particular problem in hand is that of the best location for deep wells. Some consideration is being given to the possibility of diverting the waters of the North Platte River upon lands in the western part of the state. The preparation of plans for storing and diverting the waters of the Truckee and Carson Rivers has been continued in Nevada.

In Oregon and Washington preliminary examinations have been made of various projects for storing and diverting water from the Cascade range. The investigation of the possibilities of central Oregon have also been continued. A general examination of possible reservoirs on Bear River, in Utah, has been continued.

The surveys of Lake De Smet, in Wyoming, have been pushed forward, and others begun upon the smaller reservoirs in the Big Horn Mountains. A preliminary examination has also been made in the vicinity of Cody, on the Sweetwater River, above its junction with the North Platte River.

Since the publication of the August number of FORESTRY AND IRRIGATION the following lands have been withdrawn from entry, pending examination of reservoir sites:

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Mr. Pinchot Goes to the Philippines.

Mr. Gifford Pinchot, Forester, U. S. Department of Agriculture, started for the Philippines Saturday, August 30. Instead of sailing from Vancouver, as he had first planned, Mr. Pinchot sailed from New York. He will make the trip to Manila by way of Russia and the Trans-Siberian Railroad, arriving there about October 15. After spending about a month inspecting the forests of the islands, Mr. Pinchot will start home on November 15, coming by way of San Francisco, and will reach Washington late in December.

Forest Fires.

There were a number of forest fires during the month of August, which did a great deal of damage to standing timber, and in many cases destroyed buildings. A majority of the fires occurred in the far west.

Wyoming.—The most serious forest fires of the month occurred in Wyoming. The worst of these fires started in the heavy timber on the Encampment River and burned furiously for several weeks. They became so serious that Governor Richards sent an urgent appeal to the Department of the Interior to send assistance, as the fires were mainly on government lands. Government agents were sent to the scene, and were empowered to employ extra assistance to fight the fires. At last accounts, through hard work, they have been gotten under control. The towns of Battle Lake, Grand Encampment, Gold Hill, and Rambler were at one time threatened with destruction.

Dispatches to the newspapers estimate the loss to standing timber at \$1,000,000. This is likely a rather high estimate, though the damage was undoubtedly great. Fires near Lander burned over a territory of 40 square miles, destroying a large amount of timber.

Wisconsin.—A number of serious forest fires were reported during August, one of which threatened to destroy the town of Florence. Many men were called out to fight the flames, and serious consequences were averted through the

coming of a heavy rainstorm. Several serious fires near Rhinelander destroyed much timber. The cut-over lands near Star Lake and Ballard Lake were burned over the last week in the month. Near Mercer forest fires caused much damage to the property of farmers.

Michigan.—During the last week in August serious forest fires near Linden caused considerable loss to farmers. A timely rain extinguished this fire. Near Mass City, in Ontonagon county, forest fires are known to have destroyed \$20,000 worth of cedar lumber at one mill, and heavy losses are reported by several other lumber operators.

Montana.—Forest fires during August were reported from Schley and Whitefish Lake.

Washington.—Forest fires in this state during August were reported from Larchmont, Whatcom, and in the north-eastern part of Clark county. A special telegram to the newspapers from Port Townsend, states that the smoke from forest fires along Puget Sound at one time became so thick as to make navigation difficult and dangerous.

California.—Forest fires are reported as having occurred near San Andreas, which destroyed several houses and barns. A fire in the redwoods near Cloverdale destroyed the tracks of the California Northwestern Railway for some distance. A fire was also reported at Dry Creek.

Oregon.—A number of forest fires in the Cascade Mountains along the Columbia River destroyed a great deal of valuable timber, the worst of the fires taking place near Multnomah Falls. Forest fires in the Siskiyou Mountains, in the Beaver, Hungry, and Grosse Creek mining sections did a great deal of damage to timber. Reports connect the occurrence of these forest fires with the bitter feeling that has grown up between the miners and the timber-land locators, who have during the present year filed notices of location on thousands of acres. Forest fires burned over 2,000 acres near Oregon City.

Colorado.—Fires are reported from the vicinity of Long's Peak, Leyden Gulch, near Golden, Colorado, Mount Baldy, Dillon, and Cassells. The most

serious fire of the month was reported as having occurred in the Greenhorn Mountains, about thirty miles from Walsenburg.

Forest fires are reported from the Wallapai Mountains, New Mexico; also

near Boise City, Idaho; in the neighborhood of Gadsen, Alabama, and City Creek Canyon, near Salt Lake City, Utah. There have been a number of destructive forest fires in the vicinity of Ymir, Vancouver, B. C.

THE TENTH NATIONAL IRRIGATION CONGRESS.

WILL BE HELD AT COLORADO SPRINGS OCTOBER 6-9.

THE official call for the Tenth Annual Irrigation Congress, to be held at Colorado Springs, Colo., October 6 to 9, has been issued. Preparations for the meeting are going vigorously forward. Mr. C. E. Wantland, chairman of the executive committee of the congress, and Hon. F. C. Goudy, a member of the executive committee of the congress for Colorado, both of Denver, and Secretary McClurg, of the Colorado Springs chamber of commerce, who is chairman of the committee on local arrangements, are now devoting the greater part of their time to the necessary preparatory work.

While it cannot be promised that President Roosevelt will attend the congress in person, it is understood that he will prepare an address to be read before the delegates.

It is likely that a large attendance will be present, and all railroads in the Western Passenger Association and in the Transcontinental Passenger Association have made rates of one-half fare, plus \$2, for the round trip from all points in this territory. These special-rate tickets will be good returning from Colorado Springs up to October 31.

Letters have been sent by the executive committee to all of the leading papers of the sixteen western states directly interested in the reclamation of

the arid region, requesting them to make known the holding of the Irrigation Congress at Colorado Springs in October.

It is planned to devote an entire day to the discussion of the national irrigation act, its operations and possibilities. Forestry will have a prominent place on the program, and the question of colo-



VIEW OF THE ROCKY MOUNTAINS NEAR COLORADO SPRINGS.

nization will also come in for close attention. Many of the leading irrigation experts of the country will be on hand to take part in the discussion. All the Senators and Representatives of the states and territories in the arid region have especially been invited to be present and take part in the proceedings of the congress.

The official call requests governors, mayors, county commissioners, cham-



THE GARDEN OF THE GODS, NEAR COLORADO SPRINGS.

bers of commerce and other business men's associations, horticultural, arboricultural, and irrigation associations to appoint delegates to the congress. The local committee will arrange for special excursions for the delegates to the summit of Pikes Peak and to the Cripple Creek district, and drives will be arranged from which the delegates may have a magnificent view of the scenery of this region. A banquet is consid-

ered as among the probabilities of the occasion.

This congress, it is expected, will not only draw to Colorado Springs those directly and personally interested in irrigation, but there will be a large attendance of bankers, lawyers, and editors from throughout the entire West. Every man who has business interests in the western states will be directly interested in its proceedings and recommendations.

Governor Orman has been invited, and it is expected will deliver an address of welcome to the delegates, followed by Mayor Robinson, of Colorado Springs, who will welcome them to the foot of Pikes Peak.

Hon. Thomas F. Walsh, president of the National Irrigation Congress, who has been spending the summer in Europe, is on his way home, and will likely arrive in time to be present.

The vice-presidents of the congress are ex-Governor Prince, of New Mexico, and Mr. F. B. Thurber, of New York city. There are vice-presidents and also members of the executive committee from every state and territory.

SUMMER MEETING OF THE AMERICAN FORESTRY ASSOCIATION.

HELD AT LANSING, MICHIGAN, AUGUST 27 AND 28.

THE summer meeting of the American Forestry Association was held at Lansing, Mich., on August 27 and 28, and was one of the most interesting held in several years.

This meeting was held in Lansing at the invitation of the Michigan Forestry Commission and the Michigan Agricultural College. The program, while made up with a special view of touching upon forest conditions in Michigan, was also

of general interest. The attendance, although below expectations, included many men well known in forest work. The program included a number of excellent papers, and a valuable innovation was the selection in advance of speakers to lead the discussion which followed the reading of each paper.

The success of the meeting, and the excursion which followed, was in a great measure due to the efforts of the mem-

bers of the Michigan Forestry Commission, Mr. Garfield, Mr. Hill, and Mr. Wildey. Mr. Garfield, as chairman, made an excellent presiding officer.

The opening session, which was held in the senate chamber at the state capitol, began at 10.30 o'clock Wednesday morning, August 27, and was called to order by Mr. Chas. W. Garfield, chairman. The address of welcome was delivered by Attorney General Powers, owing to the absence of Governor Bliss.

The opening paper, on "The Climate of the White Pine Belt," by Prof. A. J. Henry, of the U. S. Weather Bureau, was most interesting and timely, and was followed by a discussion led by Prof. C. F. Schneider.

The chairman appointed a committee on resolutions, consisting of Mr. Arthur Hill, of the Michigan Forestry Commission; Mr. Thos. H. Sherrard, of the Bureau of Forestry; and Dr. A. C. Lane, State Geologist of Michigan.

The afternoon session was held in the Botanical Laboratory at the Michigan Agricultural College, and was called to order by Chairman Garfield at 2.30 p. m. The first paper was on "The Trespass Problem and How to Solve It," by Mr. Ernest Bruncken, Secretary of the late Wisconsin State Forestry Commission. Mr. Bruncken's paper was an especially able one, and touched upon a forest question of prime importance in the Lake States. The discussion following this paper was led by Mr. F. E. Skeels, State Trespass Agent. Mr. Skeels, through wide experience in handling trespass cases, pointed out the difficulty of controlling this matter in Michigan, and suggested remedies to abate the evil.

The next paper was on the "Jack Pine Plains of Michigan," and was written by Prof. Filibert Roth, of the General Land Office, Department of the Interior. Owing to the absence of Professor Roth, his paper was read by Mr. Luebker. This was an especially timely paper, as the question of forest reserves in Michigan is closely connected with the Jack Pine Plains. The discussion which followed the reading of this paper was led by Mr. Garfield.

Following this was the reading of a paper by Prof. Charles A. Davis, of the University of Michigan, on "Forest

Botany Suggests What, for the New Forests of Michigan?" Prof. W. J. Beal led the discussion which followed. The last paper of the afternoon session was read by Prof. E. E. Bogue, of the Michigan Agricultural College, on "The Periodicity of Tree Growth."

The meeting was then adjourned, and the delegates present were conducted by Professor Beal through the arboretum on the college grounds and also through the college botanical gardens.

The evening session was also held at the Agricultural College, the leading feature of the program being an illustrated talk on "The Michigan Forest Preserve," by Mr. Thomas H. Sherrard, of the Bureau of Forestry. Mr. Sherrard, who had made an examination of the preserve, at the request of the Michigan Forestry Commission, gave an excellent description of the character of the lands that make up the preserve, and offered suggestions concerning their future management. The discussion that followed was led by Mr. Edwin A. Wildey, State Land Commissioner and a member of the State Forestry Commission. This was followed by a paper on the "Relation of Soils and the Distribution of Forests in Michigan," by Prof. Burton E. Livingston, of the University of Chicago. The discussion was led by Dr. A. C. Lane. Governor Bliss was present at this session and made an address.

The morning session on Thursday, August 28, was held in the senate chamber, at the state capitol. The first paper was by Mr. Walter C. Winchester, of Grand Rapids, on the "Management of Michigan Hardwood Forests." Mr. Winchester, who is a practical lumberman, described the present methods of lumbering in the hardwood forests of the state, and made some valuable suggestions looking to the improvement of the same. The discussion of this paper was led by Mr. Garfield.

The next paper was by Mr. Frank G. Miller, of the Bureau of Forestry, on "The Farm Woodlot." The discussion of this paper was led by Mr. George B. Horton, Master of the State Grange. Mr. Horton called attention to the importance of the farm woodlot, and cited a number of interesting experiments

which he has made on his own farm. The next paper was on "The Shifting Sand Question," and was presented by Dr. John C. Gifford, of the New York State College of Forestry. Dr. Gifford called attention to the importance of this problem in an interesting manner. He cited numerous instances of the reclamation of waste sand lands by means of forestation. The discussion of his paper was led by Prof. Charles A. Davis.

The final session was held Thursday afternoon in the senate chamber. The session opened with a paper by Mr. H. B. Ayres, of Carlton, Minn., on the "Fire Problem and How to Solve It," and also a paper on "Minnesota's System of Preventing Forest Fires," by General C. C. Andrews, Chief Fire Warden of Minnesota. Prof. W. J. Beal led the interesting discussion that followed the reading of these two papers. Owing to the absence of Mr. Gifford Pinchot, Forester of the U. S. Department of Agriculture, his topic on "The Duty of the State in Forest Matters" was assigned to Mr. Arthur Hill, of the Michigan Forestry Commission, who discussed the subject in an able and practical manner. Mr. Hill was followed by Governor Bliss and others.

A resolution heartily endorsing the action of the State of Michigan in establishing a forest preserve was unanimously adopted. A vote of thanks was tendered the members of the Forestry Commission and the Michigan Agricultural College for the many courtesies extended. The thanks of the convention were also extended to the state authorities for the use of the rooms at the state capitol, and to the Governor and other state officers who participated in the meeting.

The meeting was then adjourned. The excursion tendered the visiting members by the Michigan Forestry Commission, began the same afternoon. The party proceeded by special train to Bay City, Mich., and thence to Roscommon. From this point the party were taken by carriage through a portion of the Michigan Forest Preserve to Higgin's Lake, where the entire party were delightfully entertained. From Roscommon the party proceeded by rail to Mackinac Island. After a visit to the

principal points of interest there, the members of the party departed for home.

Among those present who evinced great interest in the proceedings and took part in the discussions, was Mr. William G. Mather, president of the Cleveland Cliffs Iron Co. Mr. Mather's corporation owns nearly 400,000 acres of hardwood lands in the upper peninsula of Michigan, and, with its railway system, ore mines, and iron furnaces, is playing a prominent part in the development of that section of the country. Mr. Mather is making a close study of practical forest methods with a view to handling his timber lands to the best advantage. Mr. James Russell, mayor of Marquette, Mich., and one of the best-known newspaper men in the state, addressed the meeting.

Others present who took an active part in the sessions were: Mr. J. J. Hubbell, Manistee, Mich.; Mr. Henry I. Armstrong, Mr. F. J. Merriam, and Mr. John H. Bissell, of Detroit; Prof. and Mrs. S. C. Mason, of Berea College, Kentucky; Mr. Samuel Redfern, superintendent of the land department of the Cleveland Cliffs Iron Co., Negaunee, Mich.; Mr. Geo. W. Howe and Mr. L. B. Rice, Port Huron, Mich.; Mr. Frank Leverett, U. S. Geological Survey; Mr. H. L. Sabsovich, Woodbine, N. J.; Professor Wheeler, U. S. Department of Agriculture; Mr. Orlando F. Barnes, Mr. Chas. C. Hopkins, Lansing, Mich.; Mr. C. I. Collins, Corunna, Mich.; Mr. C. D. McLouth, Muskegon, Mich.

The visitors to this meeting from other states must have been deeply impressed with the importance of a system of forest protection in Michigan. They must also have noted what an uphill fight will have to be made in order to arouse the people of the state to action. However, an excellent start has been made in the selection of the Forest Commission. Mr. Garfield, Mr. Hill, and Mr. Wildey are men of wide experience, they enjoy the confidence of the people, and in the short time since the creation of the commission have made headway in the movement for forest protection, in the face of a most discouraging outlook. It is hoped that this meeting will result in advancing the cause for which they are laboring so unselfishly.



DAVID MACLEAN PARRY.

DAVID MACLEAN PARRY, president of the National Association of Manufacturers, and one of the first prominent manufacturers of the United States to take up the cause of reclamation of arid lands, was born in Pennsylvania, March 26, 1852, on a farm 16 miles from Pittsburg. Mr. Parry's father removed to a farm near Laurel, Franklin county, Indiana, in 1853. Mr. Parry worked upon his father's farm until 17 years of age. His schooling was secured during the winter months, though most of his education was received from his mother. When 17 years of age young Parry secured a position as clerk in a general store at Columbus City, Iowa. In 1871 he was employed in a wholesale dry-goods house in New York city. Mr. Parry returned to Connersville, Indiana, in 1873, where he engaged in the hardware business.

In 1876 Mr. Parry's father became financially involved. The son, who had started a prosperous hardware business, showed his manhood when he sold the entire business and turned the proceeds over to his father, relieving him of his financial difficulties. Mr. Parry secured a position as traveling salesman, and in 1878 he purchased a small hardware store in Rushville, Indiana. Later he and his brother, T. H. Parry, started a small manufacturing establishment in Rushville. This was eventually removed to Indianapolis, where it has been developed into the largest buggy manufacturing plant in the world. The number of employes has increased from 20 to 2,000.

Mr. Parry is what may be called a strictly self-made man. Without having enjoyed the advantages given to many young men, he has made himself felt in the world, and has been signally honored in a local and national business sense. He has been president of the Indianapolis Board of Trade, of the Indianapolis Commercial Club, of the National Carriage Builders' Association, and other organizations.

Mr. Parry became interested in the irrigation question several years ago, and he has steadily given the movement his sincere and earnest support. He was strongly influential in getting the National Association of Manufacturers to take up the subject officially and place itself on record in annual convention in favor of a national irrigation law.

NOTES ON A NORTHWESTERN FIR.

THE NOBLE FIR—*ABIES NOBILIS*.

BY J. GIRVIN PETERS.

THE following notes on the Noble Fir (*Abies nobilis*) were taken during the summer of 1901 while the writer was in the camps and mills of the Bridal Veil Lumbering Company in Oregon. It is in this region, on the western side of the Cascade Mountains, that the Noble Fir reaches its best development. Owing to the almost inaccessible elevations at which the tree is found, it is little logged, and hence is little known; still it is one of the important timber trees of the Northwest. Though its lumber is manufactured on a large scale by practically only one company, it is found in the eastern market today, and its good qualities have been recognized by such consumers as the Cramps, of Philadelphia.

The product of the Noble Fir is known to the lumbermen of Oregon and Washington as Larch, and is sold as such. It is sometimes called Silver Fir.

UTILITY.

From a commercial standpoint larch lumber is valuable. It will fit in wherever the tide-land Spruce will go; it frequently takes the place of Red Fir, and compares favorably with eastern White Pine.

The wood is close-grained, and when dry is very light. In drying it loses from 40 to 50 per cent of its green weight, which is from 3,500 to 4,000 pounds per 1,000 feet, board measure. It may be said, by way of a comparison, that where larch lumber is left in the dry kiln for ten days, Red Fir is taken out at the end of three days, which indicates something of the relative porosity of these two kinds of lumber. The wood of the Noble Fir is very soft, even softer than that of the eastern White Pine, and is easily worked. Its freedom from pitch makes it especially valuable for interior finish and for all kinds of molding, and,

as it takes paint well, much of the timber is manufactured into bevel siding for exterior work.

The sap wood is almost white, and the heart wood is of variegated tints, which shade from a light reddish brown to almost purple, and give to bastard stuff the appearance of a beautifully wavy grain. Larch timber, sawed at such an angle to the grain as to produce a wavy effect, can be turned into material for interior work, which shows up quite well when finished in oil. For dimension stuff and bridge timbers Larch is not so well adapted as Red Fir.

A new phase of the larch-lumber industry, and one of no mean economic importance, is in turning the second-grade stuff into box lumber. There is a ready market for this in Oregon among the many fruit-packers in the valleys of the Willamette and the Columbia Rivers and their tributaries.

Though, as yet, no experiments have been made to test the suitability of the wood for pulp, its long, soft fiber and its freedom from pitch would seem to make it of value for this purpose.

DISTRIBUTION.

The Noble Fir extends in a zone, between elevations of 2,000 and 4,000 feet, along the western slope of the Cascade Range, from the southern slope of Mt. Baker, in northern Washington, to the summit of the Siskiyou, in southern Oregon. Upon the eastern slope of the Cascades the tree occurs much less abundantly and at generally higher elevations than upon the western side. In the Coast Range, from Olympia to the Rogue River Mountains, it is distributed scatteringly upon high, isolated spots, often rising to an altitude of 5,000 feet.

The Noble Fir is found in greatest quantities in the Cascade Range in Oregon, just south of the Columbia

River, where the Bridal Veil Lumbering Company, with great skill and perseverance, has succeeded during the past fifteen years in logging this timber at high altitudes. The almost inaccessible locations of this tree, enhancing the difficulty of lumbering, have prevented the less ardent lumbermen from entering its domain, with the result that at present the Bridal Veil Company is practically the only extensive manufacturer of larch lumber.

The merchantable stand of larch timber in Oregon alone has been estimated at 2,000,000,000 board feet, or about

one-seventy-fifth as much as the stand of Red Fir. In Washington larch timber has not been exploited, and there are no estimates of the stand available.

GROWTH.

The silvery, bluish-green foliage, the large, upright cones, and the close, light-colored bark make the tree conspicuously beautiful. It develops a straight, symmetrical stem, often rising to a height of 300 feet, the clear length of which is from 150 to 180 feet. The diameter at the bases of the trees ranges



LARCH TIMBER ON THE EDGE OF A CLEARING.

from 3 to 9 feet. The age of the majority of the trees is between 250 and 500 years, though some of the largest specimens have shown nearly 1,000 annual rings.

Mr. A. J. Johnson has submitted the following figures concerning the early growth of the Noble Fir, from seeds germinated in his nursery at Astoria, Oregon, where the elevation above sea-level is about 10 feet :

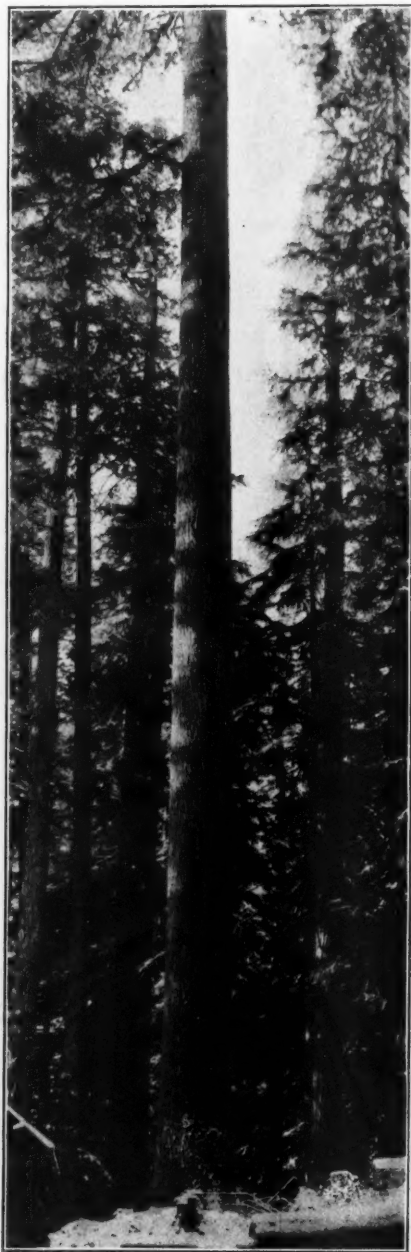
One-year-old seedling,	2 inches high.
Two-year-old "	4 " "
Three-year-old "	8 " "
Four-year-old "	13 " "
Five-year-old "	24 " "
Six-year-old "	36 " "
Seven-year-old "	54 " "
Eight-year-old "	72 " "
Nine-year-old "	96 " "
Ten-year-old "	120 " "

In the forest the growth, which is about 84 inches in ten years, is much slower than under cultivation, as would naturally be expected. From the above figures it can be seen that the tree is of fairly rapid height growth.

Under very favorable conditions as high as 12,000,000 board feet have been known to grow upon a quarter section. In this special instance the tree was in an almost pure stand with a slight mixture of Hemlock only. However, near its minimum limit of elevation, among the Red Firs and Hemlocks, usually there are but one or two larch trees to the acre, though these are among the finest specimens in the forest.

The tree seeks cool situations, and requires an extremely moist climate. There is ample proof of this from the fact that comparatively few of the species have been found upon the eastern slope of the Cascades, where the rainfall rapidly diminishes from a yearly average of over 60 inches at the crest of the mountains to less than 20 inches in the semi-arid chaparral districts of eastern Oregon and Washington. A deep, moist, and fertile soil is essential to its best development.

Regarding the adaptability of the Noble Fir to our eastern climate with a view to planting, for ornamental purposes more especially, something of im-



VIEW SHOWING THE CLEAR LENGTH OF A NOBLE FIR.

portance may be gleaned from the following note, submitted by Mr. Josiah Hoopes, of West Chester, Pa.: "When a young man I conceived the idea of planting in our climate all the rarer conifers with a view of testing their availability. A number of species was accordingly procured and planted in a group with a southern exposure, somewhat protected from the bleak north-west winds. The result today, after half a century, is certainly very gratifying.

"In this group, now too crowded for perfect development, are the following species: *Abies Nördmaniana*, *Abies nobilis*, *Abies grandis*, *Abies pichta*—a weeping form of *Abies pectinata*, *Abies Cephalonica*, *Picea excelsa*, *Picea orientalis*, *Picea obovata*, and *Picea menziesii*.

"*Abies nobilis*, being surrounded by the others and densely shaded by their interlocking branches, has not had a fair test, but the *Abies grandis* (var. *lasiocarpa*?) is certainly grand in its proportions, notwithstanding the lower branches are gradually dying out. The *Abies grandis* is fully 50 feet high, with the diameter of its trunk 30 inches."

The *Abies nobilis* referred to by Mr. Hoopes was planted in 1854, and it is still quite healthy. Its height is about 45 feet, and its diameter, close to the ground, is 18 inches.

In England, where the tree was introduced immediately after its discovery by Douglas, in September, 1825, one of the largest specimens was, in 1891, 71 feet high. It was planted, where it now stands, in the pinetum at Dropmore, near Windsor, in 1837.

TOLERANCE OF SHADE AND REPRODUCTION.

A marked characteristic of the Noble Fir at apparently every stage of its growth is its intolerance of shade. The young seedlings require no shade when growing naturally, and are found only in clearings caused by fire or lumbering. One will look almost in vain for a noble fir seedling in the forest, but where there is an opening admitting sufficient light one will usually find a fairly good reproduction. Natural pruning goes on rapidly, and the long, clear stem shoves

its crown skyward, quite overtopping the associating species in the struggle for full enjoyment of the light.

Seed crops are produced at intervals of two to three years.

ENEMIES.

The chief enemy of the Pacific Coast forests is fire, but the Noble Fir is rather fortunate in occupying moist situations, where fires can gain but little headway except during a prolonged dry season. The tree is not easily thrown by storms.

The Noble Fir is attacked by a number of diseases, of which one of the most severe is a fungus, *Echinodontium tinctorium*, very common also on the Western Hemlock. This fungus enters at the top of the tree and produces a soft rot of the heart wood. Another prevalent fungus is the western form of the *Trametes pini*, which causes a so-called speckled rot or dote on the eastern conifers. This fungus enters at the top of the tree also. A third fungus, *Polyporus schweinitzii*, is a widely distributed species which enters at the ground.

By far the most common diseases are those which work in at the top and extend to the butt as the age of the tree increases, producing what is known to lumbermen as "dry rot."

CHARACTER OF FOREST.

The character of the larch forest is a high story of Larch with an understory of Hemlock, or of Hemlock and Red Fir. In the latter case the Red Fir forms a story intermediate to the Larch and the Hemlock. Apparently the tree is not adapted for pure forests, and it is rarely found as such, owing chiefly to its comparatively short and more or less thinly foliated crown, which the sun's rays freely penetrate, thus endangering a suitable degree of moisture in the soil.

The finest specimens are found where there is a dense understory of Red Fir and Hemlock, forming a complete soil cover, which, with the luxuriant undergrowth so characteristic of the Pacific Coast forests, preserves excellent conditions of soil moisture.

The most common associate of the

Noble Fir throughout its entire range is the western Hemlock (*Tsuga mertensiana*). At the lower elevations of its habitat occur Red Fir (*Pseudotsuga taxifolia*), Mountain White Pine (*Pinus monticola*), and Pacific Cedar (*Thuja plicata*). At the higher elevations Lodgepole Pine (*Pinus murrayana*), Amabilis Fir (*Abies amabilis*), Alpine Fir (*Abies lasiocarpa*), Mountain Hemlock (*Tsuga pattoniana*), and Alaska Cedar (*Chamaecyparis nootkatensis*).

EFFECT OF LUMBERING ON REPRODUCTION.

The method of lumbering noble fir timber, while it is essentially practical from the point of view of the lumberman, accomplishes in part the object of the forester. The sound Larch and Red Fir, when Red Fir is in mixture, are cut to a diameter limit of 18 inches, but, as almost every tree is over 18 inches, the portion of the forest which is being operated is practically clear cut of Larch and Red Fir.

Hemlock timber brings a price insufficient to warrant its transportation at high altitudes, and hence it is rarely logged. In consequence there remains, after the Larch and Red Fir have been exploited, a hemlock forest of no mean density, and one that affords ample protection to the soil from the injurious effects of drying out and of excessive rain-washing.

After a portion of a forest has been cleared of its desirable timber, there are usually left standing upon the sides of the clearing sufficient trees to answer the purpose of seed trees, from which the seed will be distributed by wind over the whole or a part of the logged area. More frequently the width of this area is too great to permit of seed being scattered over the entire clearing, so that

reproduction takes place only along the edges of the clearing, and forms a lining of 200 to 250 feet in width.

The Red Fir also has but little shade endurance, and reproduces only on cleared areas. The Hemlock, however, is extremely tolerant of shade, and reproduces prolifically, even in the densest growths. Under these conditions, then, lumbering operations can injure, though inconsiderably, the young growth of Hemlock; on the other hand, since there is practically no young growth of Noble and Red Firs in the forest, lumbering operations, instead of retarding, as is erroneously thought, encourage at least a partial reproduction of these important species, by clearing areas upon which the young seedlings are to germinate.

LOG TRANSPORTATION.

The method of transporting larch timber at high altitudes may here be touched upon only in a very general way. Donkey engines are used for hauling the logs over skidways by means of wire cables to a narrow-gauge railroad, where the logs are "dogged" into a train, and are then drawn by a locomotive to the saw-mill. The ties act as skids, and to prevent frictional wearing as much as possible, they are watered by the locomotive which precedes the train of logs to the saw-mill. Frequently, where the felling operations are at some distance from the railroad, it is both expedient and economical to construct chutes, down which the logs, after having been drawn into position by donkey engines, are shot into artificial storing ponds adjacent to the railroad, whence they are drawn by a locomotive to the mill. Where trees are found in deep and almost inaccessible canyons a log trolley is used.

IRRIGATION AND RICE GROWING IN LOUISIANA.

RECENT GROWTH OF RICE INDUSTRY DUE MAINLY TO IRRIGATION.

RICE growing in Louisiana had its inception during the first year of the civil war, but the industry did not at-

tain large proportions until in the seventies, when the crop averaged nearly 30,000,000 pounds annually, increasing

AN IRRIGATION CANAL IN THE RICE-GROWING REGION, NEAR JENNINGS, LOUISIANA. PHOTO REPRODUCED THROUGH COURTESY OF MR. S. L. CARY



to more than 51,000,000 in 1890, and to 172,732,430 pounds in 1899.

During the periods preceding the census year of 1890 and continuing up to 1894-'5 the areas in rice were mainly on the lowlands along the lower Mississippi River and its outlying bayous. Being comparatively level and low, with a slope from the streams, these lands are subject to overflow unless protected by dikes to confine the river to its channel. Drainage is as essential as irrigation, and the ditches are made to serve the double purpose of carrying water upon the land for irrigation and drawing it off when the crop is ready for harvest.

The water supply for the lowlands is obtained in various ways, the most common being by means of a flume or "dahl" in the river levee, constructed on much the same principle as the trunk which is used in the Carolinas in irrigating plantations on tidal streams. The "dahls" were formerly made of sound 3-inch cypress planks of one length. This was supported by three brick walls built so as to extend some distance below the top of the woodwork to keep out crawfish and muskrats, which would otherwise work along the flume and create openings in the levee. The present flumes, under the requirements of a state law, are made of iron without brick supports or mortar protection and are not as substantial or satisfactory in all cases as those of cypress.

The land cultivated in many of the plantations was formerly planted to sugar cane. As it lies below the surface of the river, siphons are replacing the flumes and take the water from the river over the levees. The siphon is usually made of boiler iron, heavy enough to be calked the same as a steam boiler. Powerful steam pumps, taking the water from the river and bayous, are used on several of the large plantations.

Another method of irrigation is by the use of tiles, which are placed at a certain distance below the surface. By stopping these at the lower end of the field the water is forced up through a layer of earth until irrigation is no longer

required, when the plugs are withdrawn and the water passes off the land through the tiles. This system is especially advantageous in a season of excessive rainfall. All of these methods are expensive, and failures are numerous owing to inadequate drainage, breaks in the levees, and frequent floods.

The discovery a few years ago that a vast area in the southwestern part of the state is admirably adapted to the cultivation of this cereal, revolutionized the growing of rice in this country and placed Louisiana far in the lead among the rice-producing states. This rice belt, extending north from the Gulf for a distance of 20 to 90 miles, is an undulating, gently sloping prairie, having ten navigable rivers and numerous lakes and bayous, and comprising over 12,000 square miles in Louisiana and Texas. At first the rice was cultivated in an exceedingly primitive way, the land being laid off in blocks and squares and irrigated with rain water collected and stored for use when needed. The success of this method, while not extraordinary, attracted many farmers, and the country began to develop rapidly. It was found that "Providence" rice, as all rice grown by the aid of rain water is called, was not always a profitable crop. Experiments proved the value of abundant irrigation, and quickly demonstrated that the prairie soil, when sufficiently watered, was unequaled for rice growing. This marked the beginning of the real development of this industry, which has made wonderful progress in the three years preceding the census. In 1899 the acreage in rice in southwest Louisiana was more than 77 per cent of that of the state.

Rice irrigation on the prairies is comparatively simple. Throughout the region are numerous ridges slightly higher than the rest of the land. It is upon these ridges that the canals are built, varying in width from 20 to 100 feet. Branching from the main canals are the laterals which run to outlying farms. The pumping plants at the head of the canals lift the water from the streams, whence it is carried in the main canal to the point of diversion on the land. More than one pumping plant is re-



WELLS ON IRRIGATION PLANT OF CARY & SONS, NEAR JENNINGS, LOUISIANA.

quired on some of the large canals, owing to the necessity of several lifts to get the water into the canal.

The land to be planted in rice is usually broken and leveled in December and January, levees turned up around the fields, and cross-levees put in, the levee work being accomplished by means of a large plow made for the purpose. Rice may be planted any time from February to June. One and one-fourth bushels of seed are used per acre, being sown broadcast or drilled, as preferred. When the rice reaches a height of from 6 to 8 inches the water is turned on the land to a depth of 2 to 10 inches to secure the best results. Stooling begins when the rice is about 11 inches high. The water is kept on the land until the heads are filled, when the levees are cut and the water turned off to permit the rice to ripen and the ground to become dry enough for the harvester. Herein the prairie region possesses a distinct ad-

vantage over the delta lands. In the former the crop is harvested the same as wheat in the northwest, while in the latter, owing to the moist soil, harvesting must be done with the sickle and requires many laborers and much time.

The numerous pumping plants, drawing millions of gallons daily from the streams and bayous, in many places have lowered the water levels, and some alarm was occasioned as to the future of the water supply. It was then ascertained that this region is underlaid with inexhaustible beds of water-bearing gravel, and flowing wells, or wells with pressure sufficient to bring the water nearly to the surface, are employed in large numbers to augment the supply. Many of these are of sufficient capacity to supply water to 100 acres of rice without diminution in their flow. A well and pumping outfit sufficient to irrigate 200 acres cost from \$1,500 to \$2,000. It is estimated that not less than 25,000

acres were irrigated in 1899 from such wells.

The total number of irrigation systems in use in the state in 1899 was 596. Of these 542 were supplied with water from streams, and the amount of land

thus irrigated was 194,788 acres. The total cost of these systems was \$2,475,964. The remaining 54 irrigation systems, costing \$53,355, were supplied by wells and irrigated 6,897 acres. The total length of ditches was 386 miles.

TREATMENT OF SECOND-GROWTH WHITE PINE.

PART II.

By WALLACE I. HUTCHINSON.

TO be ranked as first-class timber a tree must be tall, straight, free from branches, and tapering as little as possible. If heavy thinning is done during the early years of the growth, straight, clean boles are not as a rule produced—that is, not in the same degree as when the woods are kept dense and the lower branches die off gradually from lack of light. Nor can we make up for this by pruning, though it may

be beneficial to some degree. Heavy thinning gives an increase of light, and consequently produces a more rapid diameter growth and coarse-grained timber.

In the case of the White Pine thinning should be carried on lightly until the end of the principal height growth, which occurs when the trees are about forty years old. Then the thinning should gradually become heavier, in or-



YOUNG WHITE PINE GROWING UNDER WHITE OAK AND PITCH PINE.

der to assist the selected trees by the removal of all inferior and diseased ones. The thinning should be done more among the dominating and dominated trees than among those which have fallen far behind in the race, although the latter may be allowed to remain to assist in the protection of the soil or as wind-breaks.

If the woodlot in question does not consist of a pure stand of White Pine, but is intermixed with hardwoods, the plan of thinning must be slightly changed.

The most important tree, which in this case is the White Pine, must be favored in every way possible. Inferior hardwoods may be allowed to remain for a certain length of time to act as nurses for the young pines, but after their period of usefulness for this purpose is past they should be removed. This removal should not be done too rapidly, as in many cases shade is beneficial, and the pines will not stand a too rapid opening of the forest cover. After the inferior trees have been removed and the pines have firmly established themselves thinning may be commenced.

What hardwood species are allowed to remain depends largely upon the commercial value of the different kinds of wood. Perhaps the trees to be favored next to the White Pine, in a mixed forest, are the White Oak and Chestnut, both of which are healthy and vigorous trees of high commercial value.

In a farm woodlot of considerable size the whole area need not be thinned in one winter, as this would cause the owner needless expense. Let him cut out gradually the timber he may need for firewood and fence posts, and within a few years his whole stand will be cleared. In some cases it may be necessary to lay out a small sum per acre for this work, but the added rapidity of growth and the consequent increased value of the trees will in the end more than compensate for the money expended. Extreme care should be taken that the remaining trees and undergrowth are not injured by the removal of the timber and brushwood.

Thinning, if carefully carried on, is of great value in the production of high-

grade timber. It affords a means of directing the growth of the wood, either towards the production of the greatest quantity or the best possible quality. Further, it preserves a suitable proportion of species in dealing with mixed woods. The danger from insects and fire is lessened by the prompt removal of dead and diseased trees, and thinning strengthens the selected trees against the injurious effects of wind and snow.



EXAMPLE OF BAD PRUNING; STUMPS OF BRANCHES LEFT.

When it is the farmer's object to produce the best quality of timber—that is, long, clear boles—it is necessary that the trees should lose their side branches to a certain height from the ground. The lower branches of trees growing in crowded woods die naturally, owing

to the lack of light. This is a very marked characteristic of the White Pine, as its branches often die to the height of thirty feet, which is also true of all light-demanding species of conifers. Sometimes the dead limbs drop quickly to the ground; in others they remain for years, eventually producing knots. If the lower branches do not drop off naturally, they are usually re-



GOOD PRUNING; BRANCHES CUT OFF EVEN WITH THE BOLE.

moved by artificial means, and to this process is applied the term pruning.

The pruning of live branches is done to increase the value of the timber, stimulate the expansion of the crown of the tree, and also to free the young growth from the too dense shade of the overhanging trees.

Pruning to free the undergrowth from

a too dense cover is usually done in woods consisting of timber of different ages. In many cases one may find a stand where a valuable, slow-growing species is liable to be shaded out by a poor, faster growing one. In this case it is preferable to prune the undergrowth rather than remove it altogether. We often notice trees which have been subject to unfavorable conditions showing signs of failing strength in their crowns. To remedy this, usually a good part of the lower limbs should be removed. This allows the tree to use all its nourishment to strengthen the crown, and in many cases this extra stimulus enables it to pass the danger point.

It is very seldom a tree is injured by the removal of dead branches. On the other hand, it may greatly reduce the danger from rot, as the tree soon covers over the opening with new layers of wood.

But a different state of affairs is met with in the pruning of green branches. Here the wound caused by the removal of the limb often becomes the point where fungi enter. The White Pine has, however, peculiar methods for overcoming this evil effect. Shortly after the limb is removed the wound is covered by a gummy sap, which protects the cut from disease until it is able to heal over, so that in a few years after careful trimming we have practically a clean bole. Pruning, however, in a crowded stand, where the limbs die naturally to a considerable height, should be confined to the dead branches exclusively.

For a farmer the easiest implement to prune with is a good, sharp axe; if wielded with accuracy, it is as good as a saw, as it leaves a smooth surface wound. Besides, pruning with an axe can be done more rapidly. It must, however, be carefully handled, as reckless cutting is apt to do considerable damage to the bark. It is a waste both of time and energy to prune a tree above a height of eight feet, which is about as high as an average man can reach with an ax and cut carefully. The branches should not be pruned in such a manner that short stumps are left sticking out from the stem, but

should be cut even with the trunk. The best time for pruning is undoubtedly in the fall or early winter.

As so many of our eastern white pine woods are seriously affected by the pine weevil, attention should be called to it. The presence of the insect is first manifested by the wilting of the terminal shoot, which, if examined carefully, will be found completely mined by the insect larvæ. A tree thus damaged will fail for several seasons to send forth a terminal shoot, with the result that the lateral branches strive with one another to gain supremacy. It is at this point that the owner of the woodlot can materially aid nature in her efforts to again produce a normal tree. A limb should be selected to take the place of the leader, and in making a choice its thriftiness and relation to the tree should be considered. After a choice has been made all the other branches of the whorl should be removed, thus giving the newly chosen leader every opportunity to develop. If the work has been judiciously done, the tree may again assume its normal shape in after years.



A TREE THAT HAS BEEN ATTACKED BY THE PINE WEEVIL.

THE RESERVOIR IDEA.

By G. M. HOUSTON.

THE recent spirited, comprehensive development of systems of irrigation reservoirs in northern Colorado is in response to several causes, some of them a little complex, but most of them of a very evident nature. In general, it may be said that the snow leaves the eastern slope of the Rocky Mountains too rapidly and too early in the season. For these reasons the irrigator and the irrigation engineer, even if all the suitable lands within one hundred miles of the foothills were devoted to grains and other so-called early crops, would be put to their wits' ends to make even a wasteful use of the riotous floods that are the result of innumerable rivulets and brooks combining in the stream beds and valleys. This is notably true of the Cache

la Poudre and the South Platte Rivers. Too often the flood season is accompanied by such seasonal rains as make the use of the passing flood unnecessary and impossible. In addition, the coming of the rainy term means the more rapid wasting of the snow in the mountains. This will be sorely needed after five days of sunshine, even though the soil may be soaked and reeking with the rains of ten days, owing to the extreme evaporative powers of the atmosphere of the Colorado Plateau.

Additional reasons that may be counted among the very evident ones that lend to the great waste of the winter snows are the forest fires and the indiscriminate cutting of timber, that have wasted the forests of the eastern



POINT WHERE NORTH POUDBRE IRRIGATION COMPANY'S DITCHES LEAVE THE NORTH POUDBRE RIVER.



VIEW SHOWING CHARACTER OF LANDS OWNED BY NORTH POUDRE IRRIGATION COMPANY.

slope. The forests of the western slope are somewhat denser and more valuable, and on that account are also attracting the man with the axe. They, too, suffer extremely from forest fires, but the snowfall and the water supply of that slope is more than sufficient for the very narrow valleys that can be irrigated on that side.

As early as fourteen or fifteen years ago the engineer of the unfortunate company that succeeded to the interests of the famous Carter Cotton, projector and developer of the North Poudre ditch, saw that owing to the very late priority of his company's ditch it would not only be very desirable, but absolutely necessary, to construct several storage reservoirs for the impounding of the waters that came down to the head of the ditch at a time when they were least needed. Although the reservoirs that he caused to be built were comparatively small, nevertheless here was the beginning of an idea that has grown and expanded in all directions, till within the last few months we have the completion of the famous Fossil Creek Reservoir. This reservoir, owing to its advantageous position as well as to its size, gives every evidence of being what its projectors have all along hoped for: absolutely the best of storage reservoirs in northern Colorado. This reservoir is the essential factor in the working out of what may be called the "transfer idea."

To refer back to the disappointed Carter Cotton and to his successors, every season added to the undeniable fact that the North Poudre ditch could have water only in the very earliest days of the irrigating season. When the real necessity for irrigation water came upon it, and when crops gave promise of a good harvest, except for a "dry ditch," it would be found wanting.

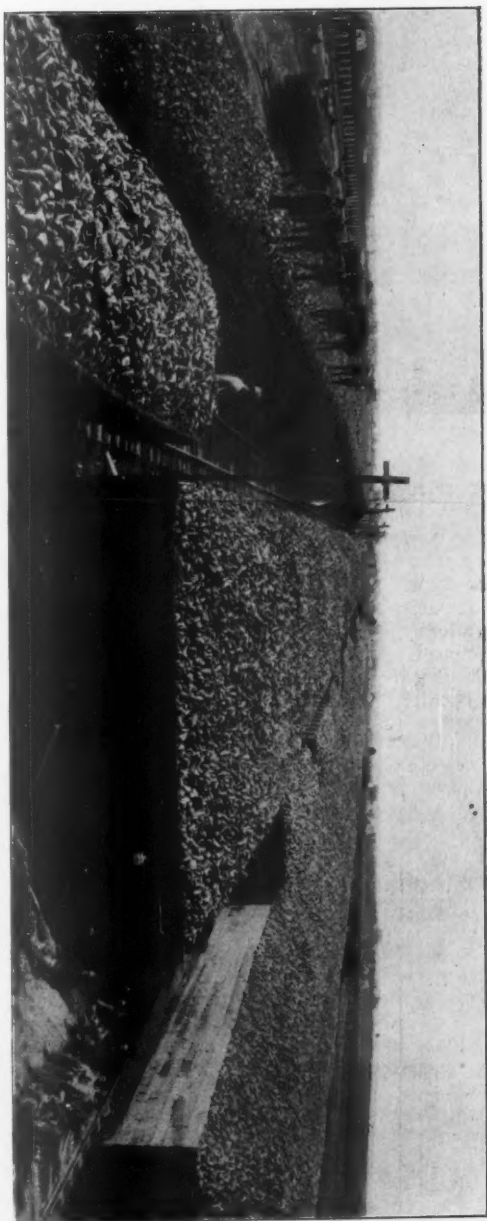
The North Fork of the Cache la Poudre, from which the North Poudre ditch takes water, is what is known as an "early stream." Early in the year there is usually an abundance of water for storage purposes from this source, in addition to the regular amount of water required for direct irrigation.

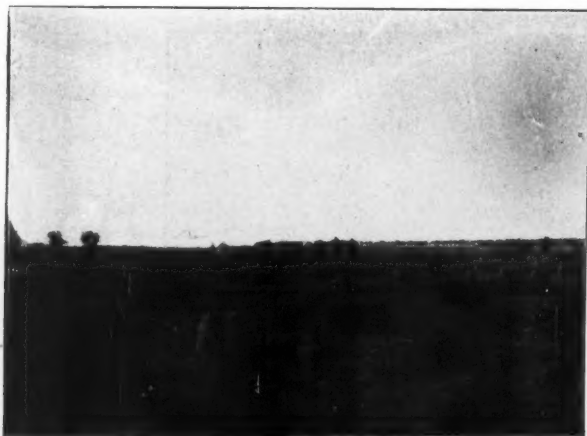
With this one fact in their favor, the North Poudre Irrigation Company, the successor in ownership of the North Poudre ditch and 20,000 acres of land lying under it, entered upon a systematic and scientific development of the reservoir idea. They have built, or rather completed, the reservoirs that nature has all but built for them on their lands lying immediately under and below the North Poudre ditch. These include in all twelve reservoirs, covering in the aggregate about 3,500 acres, with a total capacity of 2,450,000,000 cubic feet of water. In these reservoirs it is the plan to store the surplus waters that come down in the early spring. However, owing to the fact that most of these reservoirs lay below the level of the best of the company's lands, they have been, on that account, of little use to their owners. To borrow from the "perpetual-motion idea," another wheel was wanting.

Strange enough, this missing wheel was found yet farther down; not only farther down the Cache la Poudre Valley, but entirely below any lands owned by the company. It was found in the shape of what is now the Fossil Creek Reservoir, a huge basin with a dam 48 feet high, 206 feet wide on the base, and 60 feet in width at high-water line. In the making of this dam the requirements were 279,585 cubic yards of clay loam, 300 car-loads of stone of 40 tons each, and four car-loads of Portland cement. There were employed on the various parts of the work of constructing this reservoir, during a great part of last winter, 325 men, 300 teams, and seven large machine graders. The reservoir, with its inlet ditch from the Cache la Poudre River, with a capacity of 400 cubic feet per second, was completed June 1, 1902, at a total cost for site, right of way, and construction of \$180,000.

A good feature of this dam is its stone pavement covering the entire inner face one foot thick, and another not less important feature is the width of its safety wasteway, through which water can be allowed to escape without danger to the dam in a stream 600 feet wide.

BELTS AT LOVELAND, COLORADO, SUGAR FACTORY READY FOR TREATMENT. THE PILE IS A QUARTER OF A MILE LONG, IS FEET DEEP, AND AVERAGES 120 FEET IN WIDTH.





A FIELD OF ONIONS NEAR GREELEY, COLORADO. THE YIELD WAS 708 BUSHELS TO THE ACRE.

and 10 feet deep, if necessity should ever arise. The outlet through which the water is to be drawn for irrigation purposes has a capacity of 600 cubic feet, or 4,500 gallons, per second of time. The discharge of this water through the outlet is governed by steel gates moving vertically. These gates are governed by screw power from the top of a stone well leading down through the middle of the dam to the stone and concrete outlet culvert.

From the winter flow of the Cache la Poudre, which at the point where the Fossil Creek Reservoir inlet leaves that stream is not the property or appropriated water of any other irrigation company, it is proposed to fill this reservoir once between the 1st of November and the 1st of April of each year. The Fossil Creek Reservoir outlet delivers water back into the Cache la Poudre River at a point immediately above

what is known as No. 2 and No. 3 canals. Both of these are large and senior appropriators of water from the Cache la Poudre River. The North Poudre Irrigation Company proposes to work its exchange idea, to the great advantage of its North Poudre ditch, by delivering out of Fossil Creek Reservoir to these two canals the water that they are entitled to from day to day on account of their appropriations on the river at their head-gates. Whereupon the owners of Fossil Creek Reservoir will call upon the River Com-

missioner to give them credit for the amount of water they are delivering from day to day; and to give them permission, on account of thus supplying the river with water, to take into their North Poudre ditch about 40 miles upstream an equal amount for their uses on their lands 20 to 30 miles up the valley.

Under this plan it is thought that the



A MACHINE PRESSING ALFALFA.

reservoir in actual practice will be emptied by the first of June, after which date the usual spring floods begin. At the time of these spring floods there is always a great deal more water than all the appropriators on the river can possibly use, and so it will be the plan of the North Poudre Irrigation Company to at once begin to fill Fossil Creek Reservoir for the second time in the year, and then go through the above process again.

Summarizing, the Fossil Creek Reservoir, added to the areas and capacities above given, makes a total of 4,200 acres covered by this company's reservoirs. These have a total capacity of 3,000,000,000 cubic feet. Figuring on a basis of the present price of reservoir

water, \$150 per million cubic feet, the Fossil Creek Reservoir twice filled and emptied will yield to its owners and water-consumers an annual service in water the amount of \$165,000. But for various reasons the price of \$150 per million cubic feet is much above the average value of stored water, and if we cut this price in two to allow for the years when, owing to rainfall, water will not be in such demand we yet have over \$80,000 in annual dividends from this investment. And those who are yet more conservative may still further reduce the price, and reduce it again, and even they will be able to see that the Fossil Creek Reservoir is destined to make four blades of grass grow where one grew before.

IRRIGATION IN MONTANA.

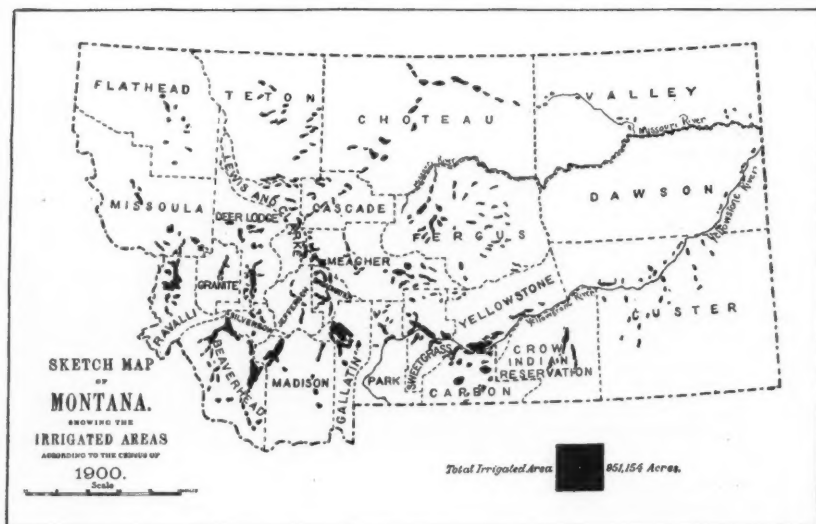
REMARKABLE INCREASE IN FARM VALUES IN THE LAST THIRTY YEARS.

THE necessity for irrigation in Montana is not so imperative as in states farther south. The table-lands and cultivable areas of the state generally are of low elevation, as the slope of the Great Plains, which constitute a large part of the state, is toward the north. By reason of its diversified physical character, comprising lofty and detached mountain ranges, broad valleys, and vast table-lands, the western end of the state receives a larger precipitation than the eastern plains. The accompanying sketch map represents by areas in solid black the main regions in which irrigation has been successfully applied to any considerable extent.

The period between 1870 and 1900 has witnessed a remarkable change in agricultural values. The census of 1870 reported live stock on farms in Montana valued at \$1,818,693, and farm lands, including buildings and implements, valued at \$729,193. In that year no report was secured of the value of live stock on the range or public domain. If account were taken of this fact, it would be seen that in 1870 the value of

live stock in Montana was at least three times that of all farm land and buildings. In the thirty years succeeding the live-stock interests gained enormously, and in 1900 had a value nearly forty times that in 1870; but the number and value of farms have increased so much more rapidly that in 1900 they were worth \$62,026,090, while the live stock had a value of \$52,161,833, or 15.9 per cent less. In 1870 farming was but an incident to live-stock raising, while in 1900 the conditions were reversed and the keeping of animals was less important than other agricultural operations. This tremendous increase in agriculture is largely due to the successful application of irrigation in the cultivation of hay and forage, cereals, fruits, and vegetables.

The number of farms outside of Indian reservations increased in ten years 132.9 per cent, the number of irrigators 117 per cent, and the irrigated area 171.3 per cent. Of the 13,047 farms in the state, excluding those in the Indian reservations, 8,043 are irrigated and 5,004 are unirrigated. The acres in the



irrigated farms number 5,822,995; in the unirrigated, 2,468,091. The value of all land in the irrigated farms, not including buildings, is \$36,057,373, and of the unirrigated, \$2,241,354. Live stock on the irrigated farms has a value of \$32,384,654; on unirrigated, \$19,777,179. The irrigated farms are 61.6 per cent of the total number, and the corresponding percentage of acreage is 70.2; that of the value of land and improvements, exclusive of buildings, 79.7; buildings, 75.6; implements and machinery, 71.2; live stock, 62.1, and that of the total of all these forms of farm wealth is 67.9.

The average size of all farms, exclusive of the holdings of the Indians, is 635 acres. The average size of irrigated farms is 724 acres, and the average amount of irrigated land on each irrigated farm is 118 acres. On the farms making use of irrigation the average value of products not fed to live stock is \$5.55 per acre. In the counties, omitting Indian reservations, the average value per acre of land, exclusive of buildings, is, for all farms, \$5.45; for unirrigated farms, \$3.71, and for irrigated farms, \$6.19. The average value of irrigated land per acre is \$19.66, while that of the best irrigated land,

suitable for the growing of alfalfa, is from \$25 to \$100; irrigated fruit land is even more valuable.

The total amount invested in irrigation ditches in Montana to June 1, 1900, is approximately \$4,683,073. The total value of irrigation products in 1899 was \$7,230,042. The number of acres of land irrigated for each mile of ditch reported is 140. The number of acres under ditch for each mile is 267. The average cost of construction per mile is \$687.47, and per acre \$4.92, for land actually irrigated in 1899. Most of the investments in irrigation ditches have been highly profitable, few disappointments following the efforts of irrigators to reclaim the arid lands.

While it is known that Montana possesses considerable quantities of ground water, or so-called underflow, but few attempts have been made to utilize it for irrigation. The ample supply furnished by the streams, and the comparatively inexpensive systems required to divert it upon the land account for the fact that there are no reports of farms irrigated from wells.

The total number of acres of irrigated crops in 1900 was 755,865, while the total number of acres of land irrigated was 951,154, the difference, 195,289

acres, representing approximately the area of pasture land irrigated. It is probable that a portion of the area upon

which crops were reported as grown without irrigation was really irrigated at some time during the year.

THE LUMBER INDUSTRY IN NEW YORK.

A HISTORY OF THE INDUSTRY FROM COLONIAL TIMES TO THE PRESENT DAY.

AT this time of unusual public interest in the forests of New York a recent publication* by the Bureau of Forestry, in which the lumber industry in that state from the days of its beginnings to the present time is described, will be of decided value.

This bulletin opens with a description of the primitive forest, its composition, the beginnings of the lumber industry, the first saw-mills, the early lumber markets, and the primitive methods of lumbering. Rafting and log-driving are graphically described, and the history of log-marks, log-scales, modern saw-mills, tanneries, and the rise of the wood-pulp industry is traced.

Just when the labor of the early settlers first took the form which we now call lumbering it is impossible to say, but it is shown that in 1623, nine years after the first house was built at New Amsterdam, three saw-mills were erected there by the Dutch West India Company; and, with their erection, commences the history of lumbering in the State of New York.

The machinery for these mills, which was shipped from Holland, was constructed to run by water-power or by windmill. One of the mills was erected on Governor's Island and was probably operated by wind-power; another, which stood on Sawmill Creek, a tributary of the East River, may have used a water-wheel. In 1639 the mill on Governor's Island was leased at an annual rental of 500 merchantable boards, half oak and half pine.

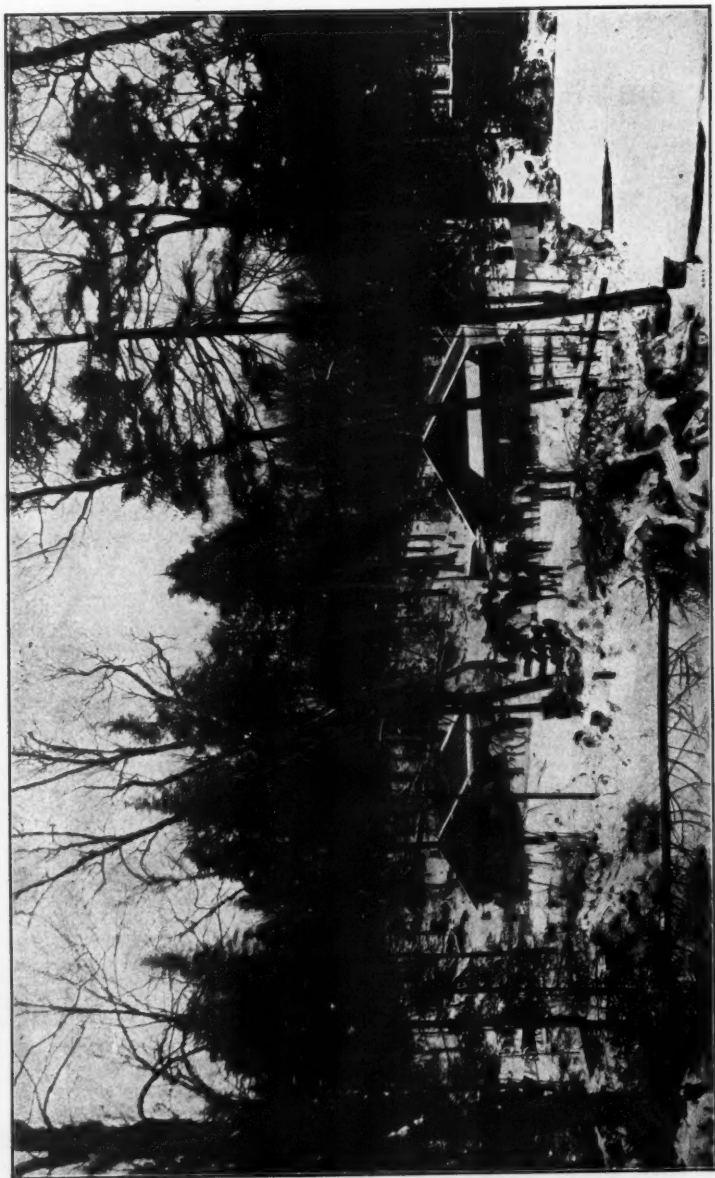
Timber thieves flourished in the early

days, and there were likewise foresters to look after them. In 1770 Adolphus Benzel, son of Archbishop Eric Benzel, of Sweden, was appointed inspector of His Majesty's woods and forests in the vicinity of Lake Champlain, at a salary of £300 per annum. It is interesting to note that as early as 1700 Lord Bellomont, governor of New York, recommended that each person who removed a tree should pay for planting "four or five young trees;" that no tree should be cut "that is marked for the use of the Navy," and that no tree or trees be cut "but when the sap is in the root."

Within the last twenty years the logging industry in northern New York has been materially affected by the demand for material necessary in the manufacture of wood-pulp, an industry of comparatively recent development. Ground pulp, obtained by holding blocks of wood against a grindstone, was first made in this country in 1867, at Stockbridge, Mass. Chemical mills, in which the fiber is reduced by the action of acids under steam pressure, were introduced about the same time. Now there are 293 mills, mechanical and chemical, in the United States, of which 102 are located in New York.

At first the New York mills used only Poplar (*Populus tremuloides*). This was deemed a desirable condition by foresters, because this species does not appear to be available for any other purpose, while at the same time it is the tree with which nature most quickly reforests burned areas in the Adirondacks. But Poplar was soon discarded in favor of Spruce, to which have been added within the last five years some of the other conifers, the process of man-

*History of the Lumber Industry in the State of New York. By William F. Fox. Bulletin No. 34, Bureau of Forestry, U. S. Department of Agriculture. Pp. 59; plates XIX.



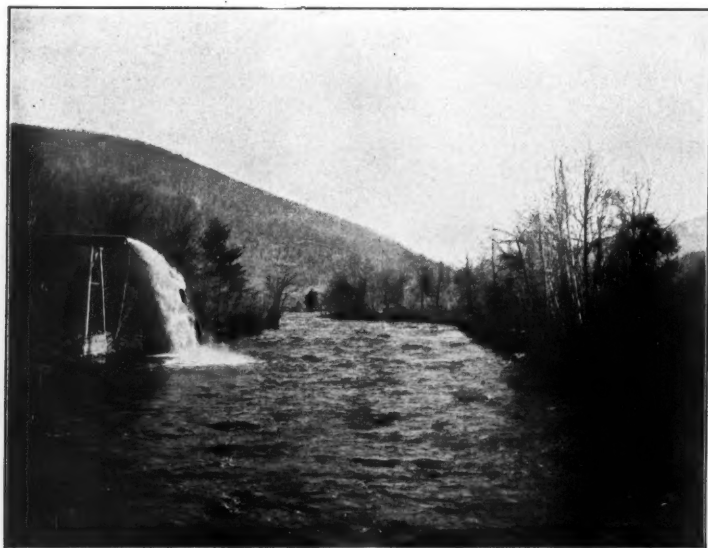
AN ADIRONDACK LOGGING CAMP.



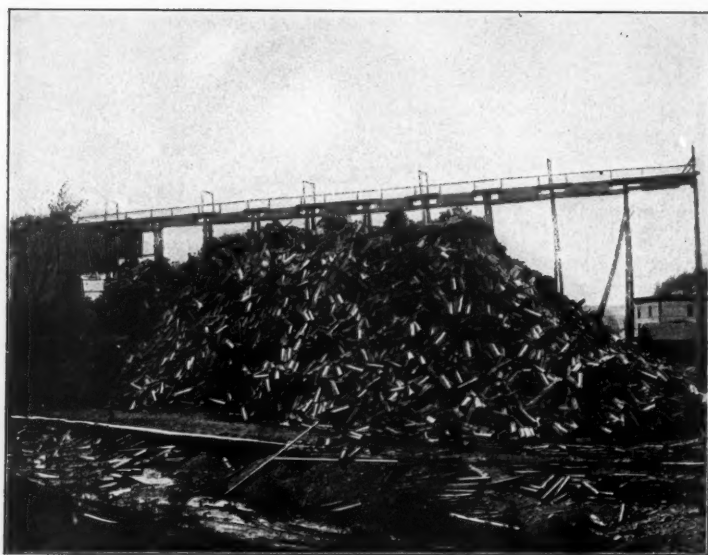
THE PULP-WOOD INDUSTRY. CUTTING SPRUCE IN THE ADIRONDACKS.



PULP-WOOD LOGS DASHING ALONG A WATER SLIDE.



THE END OF THE SLIDE.



STACK OF FOUR-FOOT PULP-WOOD LOGS AT THE MILL.

ufacture having been improved so that a satisfactory fiber is now being obtained from Hemlock, Pine, and Balsam.

The effect of the wood-pulp industry on timber-cutting was soon evident. Where the lumbermen formerly took nothing less than two-log trees, leaving nearly all that were 12 inches or less in diameter, the wood-pulp men cut all the trees of certain species, large and small. This close cutting left no provision for future growth, and thinned the forests so severely in places that further damage was inflicted by wind and ice storms.

It will probably be news to many persons that the lumber industry of New York attained its maximum development at some time prior to 1865, when there were, according to the state census of that year, 3,963 saw-mills. Perhaps three-fourths of this number were mills equipped with one saw only, none of which cut over 100,000 feet in a year.

From the Tenth United States Census (1880) it appears that there were then 2,822 mills in New York, with an invested capital of \$13,230,934, giving employment to 17,509 men, and paying out annually \$2,162,972 in wages. The combined lumber product of these mills amounted in 1880 to 1,148,220,000 feet, board measure, not including laths, shingles, and staves.

Within the next twenty years there was a great decrease in production. There are not over 150 mills in the state to-day with an annual output of over 100,000 feet. The production is now confined almost wholly to the Adirondack region, the mills which are stocked from there having sawed in 1899 the following amounts:

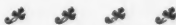
	Feet, B. M.
Spruce.....	148,203,491
Hemlock	46,545,772
Pine.....	33,132,807
Hardwood	24,296,554
Total	252,178,624
	Number.
Shingles.....	33,619,000
Laths.....	49,329,090

To the amount of sawed lumber should be added 195,568,623 feet of logs that went to the pulp mills, making the total forest output of northern New York that year 447,747,247 feet.

There are several small saw-mills in the Catskill counties, with a few others scattered throughout the western part of the state, their combined product not exceeding 60,000,000 feet. The advocates of conservative forest management need no better argument than is contained in the foregoing figures, showing the great decline in this industry within the last twenty years.

Many people attribute the disappearance of the forests to the work of the lumbermen. This Colonel Fox points out is an error. He shows this is due to the farmer, not to the lumberman. In clearing his land the farmer cuts and burns every tree and bush for the purpose of improving his land. The lumberman takes only a few scattered trees to the acre, confining his selection to some merchantable species. The carelessness of the farmers in burning their brush and log heaps has caused many of the fires that have destroyed so much of our forests. Lumbermen do not start fires for their work. The cutting and skidding are mostly done in the late fall, and the log-hauling in winter, when the woods will not take fire. The writer further claims that "had no other industry but lumbering been carried on within our borders, the once unbroken forests of New York would still be standing."

Colonel Fox's bulletin makes available for the first time in concise form the particulars of the lumber industry in New York. It gives an excellent view of the beginnings, methods, and various stages through which this important industry has passed. It contains a lot of information that should be of value in determining a policy for the future management of the state forests. An attractive feature is the large number of excellent illustrations, several of which are reproduced here.



RECENT PROGRESS IN DENDRO-CHEMISTRY.

REVIEW OF RECENT ARTICLES IN LEADING CHEMICAL JOURNALS.

BY WILLIAM H. KRUG,

Bureau of Chemistry, U. S. Department of Agriculture.

CONCERNING Benzoin. E. Knoevenagel and J. Arndts (Ber. deutsch. Chem. Ges., 35, 1982). A study of the action of alkalies on gum benzoin. The authors find that when benzoin is digested with a 60 to 80 per cent solution of an alkali in a closed vessel as much as 40 per cent of the gum is converted into benzyl alcohol and benzoic acid when the alcohol is removed by means of water vapor. Prolonged action both at low and high temperatures produces toluylene hydrate, hydro-benzoin, and a body having the formula $C_{18}H_{18}O_2$.

Sucrose in the Seeds of *Gingko biloba* and *Camellia theifera*. U. Suzuki (Bull. Coll. Agr. Tokio, 4, 350). The seed of *Gingko biloba* contain almost 6 per cent soluble sugars, chiefly sucrose, while those of *Camellia theifera* were found to contain 5 per cent.

The Volatile Oil of the Wood of *Cryptomeria japonica*. C. Kimoto (Bull. Coll. Agr. Tokio, 4, 403). The wood, which has an odor resembling peppermint and is used in the manufacture of sake-casks so as to impart a certain aroma to the beverage, contains an ethereal oil which the author isolated by distillation with steam and purified by fractionation. The fraction possessing the most pleasant odor was obtained between 260° and 270° C., and had the elementary formula $C_{30}H_{48}$. The author supposes that this fraction resembles camphor and suggests the name sugiol. It is a neutral oil, almost insoluble in water, soluble in alcohol, ether, and chloroform, B. P. = 264°, $D_{20}^{25} = 0.935$.

Kaki-Shibu. M. Tsukamoto (Bull. Coll. Agr. Tokio, 4, 329). The juice of the unripe fruit of the kaki tree, *Diospyros kaki*, L., is used in Japan for the impregnation of fish nets and wrap-

ping papers and renders these more durable. Author finds the value of this juice to depend on a peculiar tannin insoluble in water and alcohol and soluble in dilute acids. It becomes insoluble as soon as the volatile acids present in the juice are removed by evaporation, and thus forms a thin coating which protects the material.

Constituents of the Flowers of the Coffee Tree. L. Graf (Ztsch. oeffentl. Chem. 8 (1892), 148). The flowers were obtained from trees twenty years old growing in Réunion. They were yellowish brown, had an intensely bitter taste, and were found to contain caffeine (0.92 per cent), phytosterol, a reducing sugar, and probably caffetannic acid.

Transmigration in Woody Plants. G. Andre (Compt. rend., 134, 1514). A study of the variations occurring in the organic and inorganic constituents during the development of the branches and leaves of the horse-chestnut. The investigation covered the period embraced by the completion of the length growth and the falling of the leaves.

The Detection of Ground Wood in Chemical Pulp. J. Hertkorn (Chem. Ztg., 26, 632). The reaction given by Kaiser (Chem. Ztg., 26, 335) is more or less common to all alkyl-sulphuric acids and aromatic sulphonic acids. The latter especially, from benzol on and inclusive of anthracene oil, give intense colorations with ground wood, while chemical pulp and Swedish filter paper in most cases are not colored. The blue or red color is more intense the more concentrated the reagent. The most intense color is obtained when the reagent is prepared by heating the hydrocarbon with the sulphuric acid until sulphurous acid is formed. In this case a slight color is obtained with

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chemical pulp, which differs, however, from that given by ground wood.

Rhimba, a Plant Wax from Madagascar. (*Revue des Produits Chim.*, 1892; abstract in *Chem. Rev. Fett u. Harz Ind.*, 9 (1892), 190). This wax, which has recently been introduced in France, is stated to be derived from the rhimba tree, but the exact origin and method of collection is unknown. It may prove commercially valuable as a basis for sealing wax and candles.

Taxine, the Alkaloid of Yew. T. E.

Thorpe and G. Stubbs (*Jour. Lond. Chem. Soc.*, 81, 874). The authors investigated the autumn-gathered leaves of male and female trees of the species *Taxus baccata*. The alkaloid taxine was obtained in the form of very fine glistening particles.

The Melting of Copal and the Losses Incurred Thereby. (Oil, Paint, and Drug Reporter, 62, 5, 44).

The Constructional Woods of British Guiana. L. M. Hill (*Proc. Inst. Civil Eng.*, 147 (1), 3).

RECENT PUBLICATIONS.

American Food and Game Fishes. By Dr. DAVID STARR JORDAN and Dr. BARTON WARREN EVERMANN. Illustrated with colored plates, text drawings, and photographs from life. Pp. 573. Special net price, \$4.00. Published by Doubleday, Page & Co., New York.

This handsome new volume, the latest in the series known as the New Nature Library, contains a popular account of all species of food and game fishes found in American waters north of the equator. It further contains keys for ready identification, the life histories, and methods of capture of the various fishes. The authors, Dr. David Starr Jordan, president of Leland Stanford University, and Dr. Evermann, of the U. S. Fish Commission, are the acknowledged leading American ichthyologists, and this book will be regarded as authoritative on the subject.

From their great funds of scientific knowledge and enthusiasm for the subject the authors have produced a delightful book. Having the enthusiasm of sportsmen and anglers, they have made their compilations in a manner that will prove highly interesting to the general reader. On the other hand, all descriptions are done with close attention to scientific accuracy. The result is a book that may be used at all times for reference and yet has all the delightful qualities of a series of well-written fishing sketches. It is easily the best nature book of the year.

This book is illustrated in an unusually attractive manner. The volume contains 10 plates in colors, 108 half-tones from photos, and 208 line drawings. The frontispiece, a colored plate showing a brook trout in natural colors, is the best piece of color printing we have seen. Perhaps the most interesting point about the illustrations is the series of photos of live fish, by Mr. A. Radclyffe Dugmore. There are more than one hundred of these.

Taken altogether, this volume is an unusually good piece of book-making, and we believe is only surpassed by the same publisher's splendid two-volume edition of the Harriman Alaska Expedition.

Nature Study and Life. By Dr. CLIFTON F. HODGE. Pp. 514. Illustrated with over 200 half-tones and line drawings. Ginn & Co., Boston, Mass.

Dr. Hodge treats the subject in an original manner. In his introductory chapter he discusses the various values of nature study under the heads of economic, æsthetic, educational, ethical, and religious. Of these he puts the economic value first. This is an unusual argument in the field of science, and yet we believe he is justified in the order. His argument on the question is strong and one that ought to be generally read.

The book proper is devoted to natural life near home, opening with a chapter on children's animals and pets. This is followed by descriptions of insects, plants, gardens, birds, and a chapter on elementary forestry.

The author has produced a book that should be of great value both to the general reader and the teacher. It will likely, however, have its greatest value as a text-book, for which purpose Dr. Hodge more especially prepared it.

The volume is splendidly illustrated with over 200 plates from photos and line drawings. A pleasing feature is the use of side headings in black-face type.

Iowa Park and Forestry Association. Proceedings of the First Annual Meeting. Pp. 80. Illustrated.

This well printed and illustrated report contains the proceedings of the first annual meeting of the Iowa Park and Forestry Association, which was held at Des Moines in December, 1901. In addition to the minutes of the meeting, its contents include the papers read at the meeting, the constitution and by-laws, and a list of the officers of the association.

Forestry in Minnesota. By Professor SAMUEL B. GREEN. Published by the Geological and Natural History Survey of Minnesota, St. Paul, Minn. Pp. 401. Illustrated.

A new and improved edition of Professor Green's "Forestry in Minnesota" has recently

been issued. The first edition of this book, which numbered 10,000 copies, was published by the Minnesota Forestry Association. That such a large edition should be exhausted in so short a time testifies to the favor with which it has been received by the public.

This volume is used as a text-book in a number of colleges, and normal and high schools.

Seventh Annual Report of the Chief Fire Warden of Minnesota for the Year 1901. Pp. 135. Illustrated.

This report, which in contents and appearance is fully up to the high standard set in previous years by General Andrews, contains an account of forest fires in Minnesota during the year 1901. It shows that the number of forest fires reported by fire wardens was fifty-five. These burned over an area of 58,395 acres, and did damage to the amount of \$42,140. There were nineteen prosecutions for causing fires and seven convictions.

This report also contains a series of articles on European forestry, and the whole is handsomely printed and illustrated.

There are a number of articles in the September magazines that are likely to interest readers of *FORESTRY AND IRRIGATION*. The *World's*

Work contains articles on "A Typical Irrigated Community" and "World Wide Lessons from Kansas Farms." In the *Atlantic Monthly* "Going Into the Woods" and the "Kansas of To-day" are subjects of interest. The *Review of Reviews* has a timely and important paper on "The Migration to the Canadian Northwest." *Outing*, *McClure's*, and *Scribner's* all contain pleasing articles on outdoor life.

PUBLICATIONS RECEIVED.

Tennessee Forest Association. Proceedings of the First Annual Meeting, held at Nashville, Tenn., November, 1901.

Lands of the Colorado Delta in the Salton Basin, Bulletin No. 140, University of California. Pp. 51.

The Pulp Industry in Canada. By D. Lorne McGibbon. Pp. 16.

Annual Report of the State Geologist of New Jersey, 1901. Pp. 178. Illustrated.

Measurement of Water for Irrigation. Bulletin 53, University of Wyoming Experiment Station. Pp. 57. Illustrated.

Report of the Horticulturist, 1901, Department of Agriculture, Canada. Pp. 87-135. Illustrated.

PUBLISHER'S NOTES.

Rawlings Institute, the well-known school for young ladies, situated at Charlottesville, Va., issues an unusually handsome catalogue for 1902. The faculty is a large and competent one and is headed by Rev. H. W. Tribble, president, to whom all inquiries concerning the school should be addressed.

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The American Plant and Seed Co. of Nashville, Tenn., whose advertisement is printed in this number, are publishing an interesting little book on the growing of nut-bearing trees for profit.

Hoopes, Bro. & Thomas, proprietors of the Maple Avenue Nurseries, West Chester, Pa., are sending out an interesting catalogue describing their stock of trees and shrubs.

A. Y. Cathcart, of Bristol, Indiana, is making a specialty of growing Japan walnut trees. His advertisement in this number is worth noting.

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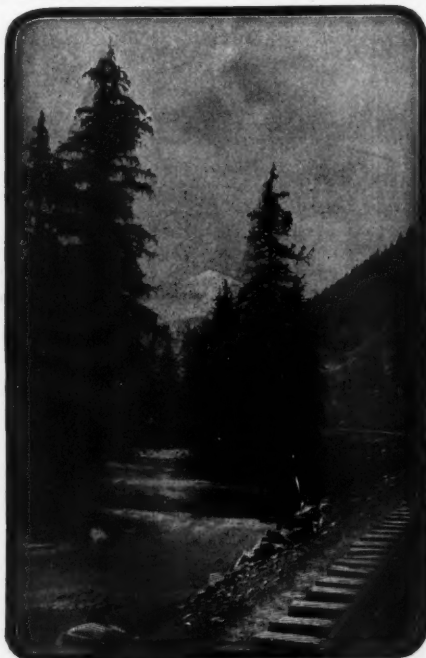
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